SEQUENCE LISTING

<110> BASF Plant Science GmbH

<120> METHODS FOR THE PRODUCTION OF STABLY TRANSFORMED, FERTILE
GRAMINEAE EMPLOYING AGROBACTERIUM-MEDIATED TRANSFORMATION OF ISOLATED
GRAMINEAE ZYGOTES

<130> PF 54757 - AE20030363

<160> 3

<170> PatentIn version 3.1

<210> 1
<211> 12739
<212> DNA
<213> synthetic: expression vector - binary vector pUGAB7

<400> 1
tctagaacat ggtggagcac gacactctcg tctactccaa gaatatcaaa gatacagtct   60
cagaagacca gagggctatt gagacttttc aacaaagggt aatatcggga aacctcctcg   120
gattccattg cccagctatc tgtcacttca tcgaaaggac agtagaaaag gaagatggct   180
tctacaaatg ccatcattgc gataaaggaa aggctatcgt tcaagatgcc tctaccgaca   240
gtggtcccaa agatggaccc ccacccacga ggaacatcgt ggaaaaagaa gacgttccaa   300
ccacgtcttc aaagcaagtg gattgatgtg atatctccac tgacgtaagg gatgacgcac   360
aatcccacta tccttcgcaa gacccttcct ctatataagg aagttcattt catttggaga   420
ggacctcgag tggccaccat gggcccagaa cgacgcccgg ccgacatccg ccgtgccacc   480
gaggcggaca tgccggcggt ctgcaccatc gtcaaccact acatcgagac aagcacggtc   540
aacttccgta ccgagccgca ggaaccgcag gagtggacgg acgacctcgt ccgtctgcgg   600
gagcgctatc cctggctcgt cgccgaggtg gacggcgagg tcgccggcat cgcctacgcg   660
ggcccctgga aggcacgcaa cgcctacgac tggacggccg agtcgaccgt gtacgtctcc   720
ccccgccacc agcggacggg actgggctcc acgctctaca cccacctgct gaagtccctg   780
gaggcacagg gcttcaagag cgtggtcgct gtcatcgggc tgcccaacga cccgagcgtg   840
cgcatgcacg aggcgctcgg atatgccccc cgcggcatgc tgcgggcggc cggcttcaag   900
cacgggaact ggcatgacgt gggtttctgg cagctggact tcagcctgcc ggtaccgccc   960
cgtccggtcc tgcccgtcac cgagatctga gatcacgcgt tctagtccgc aaaaatcacc   1020
agtctctctc tacaaatcta tctctctcta ttttttctcca gaataatgtg tgagtagttc   1080
ccagataagg gaattagggt tcttataggg tttcgctcat gtgttgagca tataagaaac   1140
ccttagtatg tatttgtatt tgtaaaatac ttctatcaat aaaatttcta attcctaaaa   1200
ccaaaatcca gtgacctgca ggcatgcaag ctgatccact agaggccatg gcggccgcgt   1260
cgagcgatct agtaacatag atgacaccgc gcgcgataat ttatcctagt ttgcgcgcta   1320
tattttgttt tctatcgcgt attaaatgta taattgcggg actctaatca taaaaaccca   1380
tctcataaat aacgtcatgc attacatgtt aattattaca tgcttaacgt aattcaacag   1440
aaattatatg ataatcatcg caagaccggc aacaggattc aatcttaaga aactttattg   1500
ccaaatgttt gaacgatcgg ggaaattcga gctcggtagc aattcccgag ctgtagccg   1560
acgatggtgc gccaggagag ttgttgattc attgtttgcc tccctgctgc ggttttttcac   1620
cgaagttcat gccagtccag cgttttttgca gcagaaaagc cgccgacttc ggtttgcggt   1680
cgcgagtgaa gatccctttc ttgttaccgc caacgcgcaa tatgccttgc gaggtcgcaa   1740

```
     aatcggcgaa attccatacc tgttcaccga cgacggcgct gacgcgatca aagacgcggt   1800
     gatacatatc cagccatgca cactgatact cttcactcca catgtcggtg tacattgagt   1860
     gcagcccggc taacgtatcc acgccgtatt cggtgatgat aatcggctga tgcagtttct   1920
     cctgccaggc cagaagttct ttttccagta ccttctctgc cgtttccaaa tcgccgcttt   1980
  5  ggacatacca tccgtaataa cggttcaggc acagcacatc aaagagatcg ctgatggtat   2040
     cggtgtgagc gtcgcagaac attacattga cgcaggtgat cggacgcgtc gggtcgagtt   2100
     tacgcgttgc ttccgccagt ggcgcgaaat attcccgtgc accttgcgga cgggtatccg   2160
     gttcgttggc aatactccac atcaccacgc ttgggtggtt tttgtcacgc gctatcagct   2220
     ctttaatcgc ctgtaagtgc gcttgctgag tttccccgtt gactgcctct cgctgtaca   2280
 10  gttcttttcgg cttgttgccc gcttcgaaac caatgcctaa agagaggtta aagccgacag   2340
     cagcagtttc atcaatcacc acgatgccat gttcatctgc ccagtcgagc atctcttcag   2400
     cgtaagggta atgcgaggta cggtaggagt tggccccaat ccagtccatt aatgcgtggt   2460
     cgtgcaccat cagcacgtta tcgaatcctt tgccacgcaa gtccgcatct tcatgacgac   2520
     caaagccagt aaagtagaac ggtttgtggt taatcaggaa ctgttggccc ttcactgcca   2580
 15  ctgaccggat gccgacgcga agcgggtaga tatcacactc tgtctggctt ttggctgtga   2640
     cgcacagttc atagagataa ccttcacccg gttgccagag gtgcggattc accacttgca   2700
     aagtcccgct agtgccttgt ccagttgcaa ccacctgttg atccgcatca cgcagttcaa   2760
     cgctgacatc accattggcc accacctgcc agtcaacaga cgcgtggtta cagtcttgcg   2820
     cgacatgcgt caccacggtg atatcgtcca cccaggtgtt cggcgtggtg tagagcatta   2880
 20  cgctgcgatg gattccggca tagttaaaga aatcatggaa gtaagactgc tttttcttgc   2940
     cgttttcgtc ggtaatcacc attcccggcg ggatagtctg ccagttcagt tcgttgttca   3000
     cacaaacggt gataccagct gcacatcaac aaattttggt catatattag aaaagttata   3060
     aattaaaata tacacactta taaactacag aaaagcaatt gctatatact acattctttt   3120
     attttgaaaa aaatatttga aatattatat tactactaat taatgataat tattatatat   3180
 25  atatcaaagg tagaagcaga aacttacgta cacttttccc ggcaataaca tacggcgtga   3240
     catcggcttc aaatggcgta tagccgccct gatgctccat cacttcctga ttattgaccc   3300
     acactttgcc gtaatgagtg accgcatcga aacgcagcac gatacgctgg cctgcccaac   3360
     ctttcggtat aaagacttcg cgctgatacc agacgttgcc cgcataatta cgaatatctg   3420
     catcggcgaa ctgatcgtta aaactgcctg gcacagcaat tgcccggctt tcttgtaacg   3480
 30  cgctttccca ccaacgctga ccaattccac agttttcgcg atccagactg aatgcccaca   3540
     ggccgtcgag ttttttgatt tcacgggttg gggtttctac aggacgtaac ataagggact   3600
     gacgtcgaat ccactagtac ctgcagaagt aacaccaaac aacagggtga gcatcgacaa   3660
     aagaaacagt accaagcaaa taaatagcgt atgaaggcag ggctaaaaaa atccacatat   3720
     agctgctgca tatgccatca tccaagtata tcaagatcaa aataattata aaacatactt   3780
 35  gtttattata atagataggt actcaaggtt agagcatatg aatagatgct gcatatgcca   3840
     tcatgtatat gcatcagtaa aacccacatc aacatgtata cctatcctag atcgatcccg   3900
     tctgcggaac ggctagagcc atcccaggat tccccaaaga gaaacactgg caagttagca   3960
     atcagaacgt gtctgacgta caggtcgcat ccgtgtacga acgctagcag cacggatcta   4020
     acacaaacac ggatctaaca caaacatgaa cagaagtaga actaccgggc cctaaccatg   4080
 40  gaccggaacg ccgatctaga gaaggtagag aggggggggg ggggaggacg agcggcgtac   4140
     cttgaagcgg aggtgccgac gggtggattt ggggggagatc tggttgtgtg tgtgtgcgct   4200
     ccgaacaaca cgaggttggg gaaagagggt gtggaggggg tgtctatttta ttacggcggg   4260
     cgaggaaggg aaagcgaagg agcggtggga aaggaatccc ccgtagctgc cggtgccgtg   4320
     agaggaggag gaggccgcct gccgtgccgg ctcacgtctg ccgctccgcc acgcaatttc   4380
 45  tggatgccga cagcggagca agtccaacgg tggagcggaa ctctcgagag gggtccagag   4440
     gcagcgacag agatgccgtg ccgtctgctt cgcttggccc gacgcgacgc tgctggttcg   4500
     ctggttggtg tccgttagac tcgtcgatcg acggcgttta acaggctggc attatctact   4560
     cgaaacaaga aaaatgtttc cttagttttt ttaatttctt aaagggtatt tgtttaattt   4620
     ttagtcactt tattttattc tattttatat ctaaattatt aaataaaaaa actaaaatag   4680
```

```
         agttttagtt ttcttaattt agaggctaaa atagaataaa atagatgtac taaaaaaatt   4740
         agtctataaa aaccattaac cctaaaccct aaatggatgt actaataaaa tggatgaagt   4800
         attatatagg tgaagctatt tgcaaaaaaa aaggagaaca catgcacact aaaaagataa   4860
         aactgtagag tcctgttgtc aaaatactca attgtccttt agaccatgtc taactgttca   4920
 5       tttatatgat tctctaaaac actgatatta ttgtagtact atagattata ttattcgtag   4980
         agtaaagttt aaatatatgt ataaagatag ataaactgca cttcaaacaa gtgtgacaaa   5040
         aaaaatatgt ggtaattttt tataacttag acatgcaatg ctcattatct ctagagaggg   5100
         gcacgaccgg gtcacgctgc actgcagcct agtaaggcct taagggccag atcttgggcc   5160
         cggtacccga tcagattgtc gtttcccgcc ttcggtttaa actatcagtg tttgacagga   5220
10       tatattggcg ggtaaaccta agagaaaaga gcgtttatta gaataatcgg atatttaaaa   5280
         gggcgtgaaa aggtttatcc gttcgtccat ttgtatgtgc atgccaacca cagggttccc   5340
         ctcgggagtg cttggcattc cgtgcgataa tgacttctgt tcaaccaccc aaacgtcgga   5400
         aagcctgacg acggagcagc attccaaaaa gatcccttgg ctcgtctggg tcggctagaa   5460
         ggtcgagtgg ctgctgtgg cttgatccct caacgcggtc gcggacgtag cgcagcgccg   5520
15       aaaaatcctc gatcgcaaat ccgacgctgt cgaaaagcgt gatctgcttg tcgctctttc   5580
         ggccgacgtc ctggccagtc atcacgcgcc aaagttccgt cacaggatga tctggcgcga   5640
         gttgctggat ctcgccttca atccgggtct gtggcgggaa ctccacgaaa atatccgaac   5700
         gcagcaagat atcgcggtgc atctcggtct gcctgggca gtcgccgccg acgccgttga   5760
         tgtggacgcc gaaaaggatc taggtgaaga tccttttga taatctcatg accaaaatcc   5820
20       cttaacgtga gttttcgttc cactgagcgt cagaccccgt agaaaagatc aaaggatctt   5880
         cttgagatcc ttttttttctg cgcgtaatct gctgcttgca aacaaaaaaa ccaccgctac   5940
         cagcggtggt ttgtttgccg gatcaagagc taccaactct ttttccgaag gtaactggct   6000
         tcagcagagc gcagatacca aatactgttc ttctagtgta gccgtagtta ggccaccact   6060
         tcaagaactc tgtagcaccg cctacatacc tcgctctgct aatcctgtta ccagtggctg   6120
25       ctgccagtgg cgataagtcg tgtcttaccg ggttggactc aagacgatag ttaccggata   6180
         aggcgcagcg tcgggctga cgggggggtt cgtgcacaca gcccagcttg gagcgaacga   6240
         cctacaccga actgagatac ctacagcgtg agctatgaga aagcgccacg cttcccgaag   6300
         ggagaaaggc ggacaggtat ccggtaagcg gcagggtcgg aacaggagag cgcacgaggg   6360
         agcttccagg gggaaacgcc tggtatcttt atagtcctgt cgggtttcgc cacctctgac   6420
30       ttgagcgtcg attttttgtga tgctcgtcag ggggcggag cctatggaaa aacgccagca   6480
         acgcggcctt tttacggttc ctggcctttt gctggccttt tgctcacatg ttctttcctg   6540
         cgttatcccc tgattctgtg gataaccgat taccgccttt gagtgagctg ataccgctcg   6600
         ccgcagccga acgaccgagc gcagcgagtc agtgagcgag gaagcggaag agcgcctgat   6660
         gcggtatttt ctccttacgc atctgtgcgg tatttcacac cgcatatggt gcactctcag   6720
35       tacaatctgc tctgatgccg catagttaag ccagtataca ctccgctatc gctacgtgac   6780
         tgggtcatgg ctgcgccccg acacccgcca cacccgctg acgcgccctg acgggcttgt   6840
         ctgctcccgg catccgctta cagacaagct gtgaccgtct ccgggagctg catgtgtcag   6900
         aggttttcac cgtcatcacc gaaacgcgcg aggcagggt acgtcgaggt cgatccaacc   6960
         cctccgctgc tatagtgcag tcggcttctg acgttcagtg cagccgtctt ctgaaaacga   7020
40       catgtcgcac aagtcctaag ttacgcgaca ggctgccgcc ctgcctttt cctggcgttt   7080
         tcttgtcgcg tgttttagtc gcataaagta gaatacttgc gactagaacc ggagacatta   7140
         cgccatgaac aagagcgccg ccgctggcct gctgggctat cccgcgtca gcaccgacga   7200
         ccaggacttg accaaccaac gggccgaact gcacgcggcc ggctgcacca agctgttttc   7260
         cgagaagatc accggcacca ggcgcgaccg cccggagctg gccaggatgc ttgaccacct   7320
45       acgccctggc gacgttgtga cagtgaccag gctagaccgc ctggcccgca gcacccgcga   7380
         cctactggac attgccgagc gcatccagga ggccggcgcg ggcctgcgta gcctggcaga   7440
         gccgtgggcc gacaccacca gccggccgg ccgcatggtg ttgaccgtgt cgccggcat   7500
         tgccgagttc gagcgttccc taatcatcga ccgcacccgg agcgggcgcg aggccgccaa   7560
         ggcgcgaggc gtgaagtttg gcccccgccc taccctcacc ccggcacaga tcgcgcacgc   7620
```

```
      ccgcgagctg atcgaccagg aaggccgcac cgtgaaagag gcggctgcac tgcttggcgt   7680
      gcatcgctcg accctgtacc gcgcacttga gcgcagcgag gaagtgacgc ccaccgaggc   7740
      caggcggcgc ggtgccttcc gtgaggacgc attgaccgag gccgacgccc tggcggccgc   7800
      cgagaatgaa cgccaagagg aacaagcatg aaaccgcacc aggacggcca ggacgaaccg   7860
   5  tttttcatta ccgaagagat cgaggcggag atgatcgcgg ccgggtacgt gttcgagccg   7920
      cccgcgcacg tctcaaccgt gcggctgcat gaaatcctgg ccggtttgtc tgatgccaag   7980
      ctcgcggcct ggccggcgag cttggccgct gaagaaaccg agcgccgccg tctaaaaagg   8040
      tgatgtgtat ttgagtaaaa cagcttgcgt catgcggtcg ctgcgtatat gatgcgatga   8100
      gtaaataaac aaatacgcaa ggggaacgca tgaaggttat cgctgtactt aaccagaaag   8160
  10  gcgggtcagg caagacgacc atcgcaaccc atctagcccg cgccctgcaa ctcgccgggg   8220
      ccgatgttct gttagtcgat tccgatcccc agggcagtgc ccgcgattgg gcggccgtgc   8280
      gggaagatca accgctaacc gttgtcggca tcgaccgccc gacgattgac cgcgacgtga   8340
      aggccatcgg ccggcgcgac ttcgtagtga tcgacggagc gccccaggcg gcggacttgg   8400
      ctgtgtccgc gatcaaggca gccgacttcg tgctgattcc ggtgcagcca agcccttacg   8460
  15  acatatgggc caccgccgac ctggtggagc tggttaagca gcgcattgag gtcacggatg   8520
      gaaggctaca agcggccttt gtcgtgtcgc gggcgatcaa aggcacgcgc atcggcggtg   8580
      aggttgccga ggcgctggcc gggtacgagc tgcccattct tgagtcccgt atcacgcagc   8640
      gcgtgagcta cccaggcact gccgccgccg gcacaaccgt tcttgaatca gaacccgagg   8700
      gcgacgctgc ccgcgaggtc caggcgctgg ccgctgaaat taaatcaaaa ctcatttgag   8760
  20  ttaatgaggt aaagagaaaa tgagcaaaag cacaaacacg ctaagtgccg gccgtccgag   8820
      cgcacgcagc agcaaggctg caacgttggc cagcctggca gacacgccag ccatgaagcg   8880
      ggtcaacttt cagttgccgg cggaggatca caccaagctg aagatgtacg cggtacgcca   8940
      aggcaagacc attaccgagc tgctatctga atacatcgcg cagctaccag agtaaatgag   9000
      caaatgaata aatgagtaga tgaattttag cggctaaagg aggcggcatg gaaaatcaag   9060
  25  aacaaccagg caccgacgcc gtggaatgcc ccatgtgtgg aggaacgggc ggttggccag   9120
      gcgtaagcgg ctgggttgtc tgccggccct gcaatggcac tggaaccccc aagcccgagg   9180
      aatcggcgtg agcggtcgca aaccatccgg cccggtacaa atcggcgcgg cgctgggtga   9240
      tgacctggtg gagaagttga aggcggcgca ggccgcccag cggcaacgca tcgaggcaga   9300
      agcacgcccc ggtgaatcgt ggcaagcggc cgctgatcga atccgcaaag aatcccggca   9360
  30  accgccggca gccggtgcgc cgtcgattag gaagccgccc aagggcgacg agcaaccaga   9420
      ttttttcgtt ccgatgctct atgacgtggg cacccgcgat agtcgcagca tcatggacgt   9480
      ggccgttttc cgtctgtcga agcgtgaccg acgagctggc gaggtgatcc gctacgagct   9540
      tccagacggg cacgtagagg tttccgcagg ccggccggc atggcgagtg tgtgggatta   9600
      cgacctggta ctgatggcgg tttcccatct aaccgaatcc atgaaccgat accgggaagg   9660
  35  gaagggagac aagcccggcc gcgtgttccg tccacacgtt gcggacgtac tcaagttctg   9720
      ccggcgagcc gatggcggaa agcagaaaga cgacctggta gaaacctgca ttcggttaaa   9780
      caccacgcac gttgccatgc agcgtacgaa gaaggccaag aacggccgcc tggtgacggt   9840
      atccgagggt gaagccttga ttagccgcta caagatcgta aagagcgaaa ccgggcggcc   9900
      ggagtacatc gagatcgagc tagctgattg gatgtaccgc gagatcacag aaggcaagaa   9960
  40  cccggacgtg ctgacggttc accccgatta cttttttgatc gatcccggca tcggccgttt  10020
      tctctaccgc ctggcacgcc gcgccgcagg caaggcagaa gccagatggt tgttcaagac  10080
      gatctacgaa cgcagtggca gcgccggaga gttcaagaag ttctgtttca ccgtgcgcaa  10140
      gctgatcggg tcaaatgacc tgccggagta cgatttgaag gaggaggcgg ggcaggctgg  10200
      cccgatccta gtcatgcgct accgcaacct gatcgagggc gaagcatccg ccggttccta  10260
  45  atgtacggag cagatgctag ggcaaattgc cctagcaggg gaaaaggtc gaaaaggtct  10320
      ctttcctgtg gatagcacgt acattgggaa cccaaagccg tacattggga accggaaccc  10380
      gtacattggg aacccaaagc cgtacattgg gaaccggtca cacatgtaag tgactgatat  10440
      aaaagagaaa aaaggcgatt tttccgccta aaactcttta aaacttatta aaactcttaa  10500
      aacccgcctg gcctgtgcat aactgtctgg ccagcgcaca gccgaagagc tgcaaaaagc  10560
```

```
        gcctaccctt cggtcgctgc gctccctacg ccccgccgct tcgcgtcggc ctatcgcggc   10620
        cgctggccgc tcaaaaatgg ctggcctacg gccaggcaat ctaccagggc gcggacaagc   10680
        cgcgccgtcg ccactcgacc gccggcgccc acatcaaggc accggtgggt atgcctgacg   10740
        atgcgtggag accgaaacct tgcgctcgtt cgccagccag gacagaaatg cctcgacttc   10800
   5    gctgctgccc aaggttgccg ggtgacgcac accgtggaaa cggatgaagg cacgaaccca   10860
        gtggacataa gcctgttcgg ttcgtaagct gtaatgcaag tagcgtatgc gctcacgcaa   10920
        ctggtccaga accttgaccg aacgcagcgg tggtaacggc gcagtggcgg ttttcatggc   10980
        ttgttatgac tgtttttttg gggtacagtc tatgcctcgg gcatccaagc agcaagcgcg   11040
        ttacgccgtg ggtcgatgtt tgatgttatg gagcagcaac gatgttacgc agcagggcag   11100
  10    tcgccctaaa acaaagttaa acatcatgag ggaagcggtg atcgccgaag tatcgactca   11160
        actatcagag gtagttggcg tcatcgagcg ccatctcgaa ccgacgttgc tggccgtaca   11220
        tttgtacggc tccgcagtgg atggcggcct gaagccacac agtgatattg atttgctggt   11280
        tacggtgacc gtaaggcttg atgaaacaac gcggcgagct ttgatcaacg accttttgga   11340
        aacttcggct tcccctggag agagcgagat tctccgcgct gtagaagtca ccattgttgt   11400
  15    gcacgacgac atcattccgt ggcgttatcc agctaagcgc gaactgcaat ttggagaatg   11460
        gcagcgcaat gacattcttg caggtatctt cgagccagcc acgatcgaca ttgatctggc   11520
        tatcttgctg acaaaagcaa gagaacatag cgttgccttg gtaggtccag cggcggagga   11580
        actctttgat ccggttcctg aacaggatct atttgaggcg ctaaatgaaa ccttaacgct   11640
        atggaactcg ccgcccgact gggctggcga tgagcgaaat gtagtgctta cgttgtcccg   11700
  20    catttggtac agcgcagtaa ccggcaaaat cgcgccgaag gatgtcgctg ccgactgggc   11760
        aatggagcgc ctgccggccc agtatcagcc cgtcatactt gaagctagac aggcttatct   11820
        tggacaagaa gaagatcgct tggcctcgcg cgcagatcag ttggaagaat ttgtccacta   11880
        cgtgaaaggc gagatcacca aggtagtcgg caaataatgt ctaacaattc gttcaagccg   11940
        acgccgcttc gcggcgcggc ttaactcaag cgttagatgc actaagcaca taattgctca   12000
 .25    cagccaaact atcaggtcaa gtctgctttt attattttta agcgtgcata ataagcccta   12060
        cacaaattgg gagatatatc atgaaaggct ggctttttct tgttatcgca atagttggcg   12120
        aagtaatcgc aacatagctt gcttggtcgt ccgcgtgaa cgtcggctcg attgtacctg    12180
        cgttcaaata ctttgcgatc gtgttgcgcg cctgcccggt gcgtcggctg atctcacgga   12240
        tcgactgctt ctctcgcaac gccatccgac ggatgatgtt taaaagtccc atgtggatca   12300
  30    ctccgttgcc ccgtcgctca ccgtgttggg gggaaggtgc acatggctca gttctcaatg   12360
        gaaattatct gcctaaccgg ctcagttctg cgtagaaacc aacatgcaag ctccaccggg   12420
        tgcaaagcgg cagcggcggc aggatatatt caattgtaaa tggcttcatg tccgggaaat   12480
        ctacatggat cagcaatgag tatgatggtc aatatggaga aaaagaaaga gtaattacca   12540
        attttttttc aattcaaaaa tgtagatgtc cgcagcgtta ttataaatg aaagtacatt    12600
  35    ttgataaaac gacaaattac gatccgtcgt atttataggc gaaagcaata aacaaattat   12660
        tctaattcgg aaatctttat ttcgacgtgt ctacattcac gtccaaatgg gggcttagat   12720
        gagaaacttc acgatcggc                                                12739


        <210>   2
  40
        <211>   11195
        <212>   DNA
        <213>. synthetic: expression vector - binary vector pSUNUbi-GFP


  45    <400>   2
        aatattcaaa caaacacata cagcgcgact tatcatggac atacaaatgg acgaacggat      60
        aaacctttc acgcccttt aaatatccga ttattctaat aaacgctctt ttctcttagg      120
        tttacccgcc aatatatcct gtcaaacact gatagtttaa actgaaggcg ggaaacgaca     180
        atcagatcta gtaggaaaca gctatgacca tgattacgcc aagctggccg cgtcgagcga     240
```

```
     tctagtaaca tagatgacac cgcgcgcgat aatttatcct agtttgcgcg ctatattttg   300
     ttttctatcg cgtattaaat gtataattgc gggactctaa tcataaaaac ccatctcata   360
     aataacgtca tgcattacat gttaattatt acatgcttaa cgtaattcaa cagaaattat   420
     atgataatca tcgcaagacc ggcaacagga ttcaatctta agaaacttta ttgccaaatg   480
5    tttgaacgat cggggaaatt cgagtcgact ctagaggatc cccggccgcc ccgactctag   540
     tcgagttact tgtacagctc gtccatgccg agagtgatcc cggcggcggt cacgaactcc   600
     agcaggacca tgtgatcgcg cttctcgttg gggtctttgc tcagggcgga ctgggtgctc   660
     aggtagtggt tgtcgggcag cagcacgggg ccgtcgccga tgggggtgtt ctgctggtag   720
     tggtcggcga gctgcacgct gccgtcctcg atgttgtggc gggtcttgaa gttcaccttg   780
10   atgccgttct tctgcttgtc ggcggtgata tagaccttgt ggctgttgta gttgtactcc   840
     agcttgtgcc ccaggatgtt gccgtcctcc ttgaagtcga tgcccttcag ctcgatgcgg   900
     ttcaccaggg tgtcgccctc gaacttcacc tcggcgcggg tcttgtagtt gccgtcgtcc   960
     ttgaagaaga tggtgcgctc ctggacgtag ccttcgggca tggcggactt gaagaagtcg  1020
     tgctgcttca tgtggtcggg gtagcgggcg aagcactgca cgccgtaggt caaggtggtc  1080
15   acgagggtgg gccagggcac gggcagcttg ccggtggtgc agatgaactt cagggtcagc  1140
     ttgccgtagg tggcatcgcc ctcgccctcg ccggacacgc tgaacttgtg gccgtttacg  1200
     tcgccgtcca gctcgaccag gatgggcacc accccggtga acagctcctc gcccttgctc  1260
     accatggtgg ctttaccaac agtaccggaa tgccaagctt acttagatcg cagatctact  1320
     agtatgatgg gtacccgggg gatccgatat cgcccgggct gcagaagtaa caccaaacaa  1380
20   cagggtgagc atcgacaaaa gaaacagtac caagcaaata aatagcgtat gaaggcaggg  1440
     ctaaaaaaat ccacatatag ctgctgcata tgccatcatc caagtatatc aagatcaaaa  1500
     taattataaa acatacttgt ttattataat agataggtac tcaaggttag agcatatgaa  1560
     tagatgctgc atatgccatc atgtatatgc atcagtaaaa cccacatcaa catgtatacc  1620
     tatcctagat cgatatttcc atccatctta aactcgtaac tatgaagatg tatgacacac  1680
25   acatacagtt ccaaaattaa taaatacacc aggtagtttg aaacagtatt ctactccgat  1740
     ctagaacgaa tgaacgaccg cccaaccaca ccacatcatc acaaccaagc gaacaaaaag  1800
     catctctgta tatgcatcag taaaacccgc atcaacatgt atacctatcc tagatcgata  1860
     tttccatcca tcatcttcaa ttcgtaacta tgaatatgta tggcacacac atacagatcc  1920
     aaaattaata aatccaccag gtagtttgaa acagaattct actccgatct agaacgaccg  1980
30   cccaaccaga ccacatcatc acaaccaaga caaaaaaaag catgaaaaga tgacccgaca  2040
     aacaagtgca cggcatatat tgaaataaag gaaaagggca aaccaaaccc tatgcaacga  2100
     aacaaaaaaa atcatgaaat cgatcccgtc tgcggaacgg ctagagccat cccaggattc  2160
     cccaaagaga aacactggca agttagcaat cagaacgtgt ctgacgtaca ggtcgcatcc  2220
     gtgtacgaac gctagcagca cggatctaac acaaacacgg atctaacaca aacatgaaca  2280
35   gaagtagaac taccgggccc taaccatgga ccggaacgcc gatctagaga aggtagagag  2340
     gggggggggg ggaggacgag cggcgtacct tgaagcggag gtgccgacgg gtggatttgg  2400
     gggagatctg gttgtgtgtg tgtgcgctcc gaacaacacg aggttgggga agagggtgt  2460
     ggaggggtg tctatttatt acggcgggcg aggaagggaa agcgaaggag cggtgggaaa  2520
     ggaatccccc gtagctgccg tgccgtgaga ggaggaggag gccgcctgcc gtgccggctc  2580
40   acgtctgccg ctccgccacg caatttctgg atgccgacag cggagcaagt ccaacggtgg  2640
     agcggaactc tcgagagggg tccagaggca gcgacagaga tgccgtgccg tctgcttcgc  2700
     ttgcccgac cgcgacgctgc tggttcgctg gttggtgtcc gttagactcg tcgacggcgt  2760
     ttaacaggct ggcattatct actcgaaaca agaaaaatgt ttccttagtt ttttaatttt  2820
     cttaaagggt atttgtttaa tttttagtca ctttatttta ttctatttta tatctaaatt  2880
45   attaaataaa aaaactaaaa tagagtttta gttttcttaa tttagaggct aaaatagaat  2940
     aaaatagatg tactaaaaaa attagtctat aaaaaccatt aaccctaaac cctaaatgga  3000
     tgtactaata aaatggatga agtattatat aggtgaagct atttgcaaaa aaaaaggaga  3060
     acacatgcac actaaaaaga taaaactgta gagtcctgtt gtcaaaatac tcaattgtcc  3120
     tttagaccat gtctaactgt tcatttatat gattctctaa aacactgata ttattgtagt  3180
```

```
     actatagatt atattattcg tagagtaaag tttaaatata tgtataaaga tagataaact   3240
     gcacttcaaa caagtgtgac aaaaaaaata tgtggtaatt ttttataact tagacatgca   3300
     atgctcatta tctctagaga ggggcacgac cgggtcacgc tgcactgcag gaattcgatg   3360
     ggctcgaggt accgagctcg gtacccactg gattttggtt ttaggaatta gaaattttat   3420
5    tgatagaagt attttacaaa tacaaataca tactaagggt ttcttatatg ctcaacacat   3480
     gagcgaaacc ctataagaac cctaattccc ttatctggga actactcaca cattattata   3540
     gagagagata gatttgtaga gagagactgg tgatttcagc ggcatgcctg caggtcgact   3600
     cagatctggg taactggcct aactggcctt ggaggagctg gcaactcaaa atccctttgc   3660
     caaaaaccaa catcatgcca tccaccatgc ttgtatccag ctgcgcgcaa tgtaccccgg   3720
10   gctgtgtatc ccaaagcctc atgcaaccta acagatggat cgtttggaag gcctataaca   3780
     gcaaccacag acttaaaacc ttgcgcctcc atagacttaa gcaaatgtgt gtacaatgtg   3840
     gatcctaggc ccaacctttg atgcctatgt gacacgtaaa cagtactctc aactgtccaa   3900
     tcgtaagcgt tcctagcctt ccagggccca gcgtaagcaa taccagccac aacaccctca   3960
     acctcagcaa ccaaccaagg gtatctatct tgcaacctct ctagatcatc aatccactct   4020
15   tgtggtgttt gtggctctgt cctaaagttc actgtagacg tctcaatgta atggttaacg   4080
     atatcacaaa ccgcggccat atcagctgct gtagctggcc taatctcaac tggtctcctc   4140
     tccggagaca tgtcgactct agaggatccc ccgggctgca gaagtaacac caaacaacag   4200
     ggtgagcatc gacaaaagaa acagtaccaa gcaaataaat agcgtatgaa ggcaggcta   4260
     aaaaaatcca catatagctg ctgcatatgc catcatccaa gtatatcaag atcaaaataa   4320
20   ttataaaaca tacttgttta ttataataga taggtactca aggttagagc atatgaatag   4380
     atgctgcata tgccatcatg tatatgcatc agtaaaaccc acatcaacat gtatacctat   4440
     cctagatcga tatttccatc catcttaaac tcgtaactat gaagatgtat gacacacaca   4500
     tacagttcca aaattaataa atacaccagg tagtttgaaa cagtattcta ctccgatcta   4560
     gaacgaatga acgaccgccc aaccacacca catcatcaca accaagcgaa caaaaagcat   4620
25   ctctgtatat gcatcagtaa aacccgcatc aacatgtata cctatcctag atcgatattt   4680
     ccatccatca tcttcaattc gtaactatga atatgtatgg cacacacata cagatccaaa   4740
     attaataaat ccaccaggta gtttgaaaca gaattctact ccgatctaga acgaccgccc   4800
     aaccagacca catcatcaca accaagacaa aaaaaagcat gaaaagatga cccgacaaac   4860
     aagtgcacgg catatattga aataaaggaa aagggcaaac caaaccctat gcaacgaaac   4920
30   aaaaaaaatc atgaaatcga tcccgtctgc ggaacggcta gagccatccc aggattcccc   4980
     aaagagaaac actggcaagt tagcaatcag aacgtgtctg acgtacaggt cgcatccgtg   5040
     tacgaacgct agcagcacgg atctaacaca aacacggatc taacacaaac atgaacagaa   5100
     gtagaactac cgggccctaa ccatggaccg gaacgccgat ctagagaagg tagagagggg   5160
     gggggggga ggacgagcgg cgtaccttga agcggaggtg ccgacgggtg gatttggggg   5220
35   agatctggtt gtgtgtgtgt gcgctccgaa caacacgagg ttggggaaag agggtgtgga   5280
     ggggtgtct atttattacg gcgggcgagg aagggaaagc gaaggagcgg tgggaaagga   5340
     atcccccgta gctgccgtgc cgtgagagga ggaggaggcc gcctgccgtg ccggctcacg   5400
     tctgccgctc cgccacgcaa tttctggatg ccgacagcgg agcaagtcca acggtggagc   5460
     ggaactctcg agaggggtcc agaggcagcg acagagatgc cgtgccgtct gcttgcttg   5520
40   gcccgacgcg acgctgctgg ttcgctggtt ggtgtccgtt agactcgtcg acggcgttta   5580
     acaggctggc attatctact cgaaacaaga aaaatgtttc cttagttttt ttaatttctt   5640
     aaagggtatt tgtttaattt ttagtcactt tattttattc tattttatat ctaaattatt   5700
     aaataaaaaa actaaaatag agttttagtt ttcttaattt agaggctaaa atagaataaa   5760
     atagatgtac taaaaaaatt agtctataaa aaccattaac cctaaaccct aaatggatgt   5820
45   actaataaaa tggatgaagt attatatagg tgaagctatt tgcaaaaaaa aaggagaaca   5880
     catgcacact aaaaagataa aactgtagag tcctgttgtc aaaatactca attgtccttt   5940
     agaccatgtc taactgttca tttatatgat tctctaaaac actgatatta ttgtagtact   6000
     atagattata ttattcgtag agtaaagttt aaatatatgt ataaagatag ataaactgca   6060
     cttcaaacaa gtgtgacaaa aaaaatatgt ggtaattttt tataacttag acatgcaatg   6120
```

```
      ctcattatct ctagagaggg gcacgaccgg gtcacgctgc actgcaggaa ttcgatatca   6180
      agctggctga gtggctcctt caacgttgcg gttctgtcag ttccaaacgt aaaacggctt   6240
      gtcccgcgtc atcggcgggg gtcataacgt gactccctta attctccgct catgatcaga   6300
      ttgtcgtttc ccgccttcag tttaaactat cagtgtttga caggatcact gcttggtaat   6360
 5    aattgtcatt agattgtttt tatgcataga tgcactcgaa atcagccaat tttagacaag   6420
      tatcaaacgg atgttaattc agtacattaa agacgtccgc aatgtgttat taagttgtct   6480
      aagcgtcaat ttgtttacac cacaatatat cctgccacca gccagccaac agctccccga   6540
      ccggcagctc ggcacaaaat caccacgcgt ctaaaaaggt gatgtgtatt tgagtaaaac   6600
      agcttgcgtc atgcggtcgc tgcgtatatg atgcgatgag taaataaaca aatacgcaag   6660
 10   gggaacgcat gaaggttatc gctgtactta accagaaagg cgggtcaggc aagacgacca   6720
      tcgcaaccca tctagcccgc gccctgcaac tcgccggggc cgatgttctg ttagtcgatt   6780
      ccgatcccca gggcagtgcc cgcgattggg cggccgtgcg ggaagatcaa ccgctaaccg   6840
      ttgtcggcat cgaccgcccg acgattgacc gcgacgtgaa ggccatcggc cggcgcgact   6900
      tcgtagtgat cgacggagcg ccccaggcgg cggacttggc tgtgtccgcg atcaaggcag   6960
 15   ccgacttcgt gctgattccg gtgcagccaa gcccttacga catatgggcc accgccgacc   7020
      tggtggagct ggttaagcag cgcattgagg tcacggatgg aaggctacaa gcggcctttg   7080
      tcgtgtcgcg gcgatcaaa ggcacgcgca tcggcggtga ggttgccgag cgctggccg   7140
      ggtacgagct gcccattctt gagtcccgta tcacgcagcg cgtgagctac ccaggcactg   7200
      ccgccgccgg cacaaccgtt cttgaatcag aacccgaggg cgacgctgcc cgcgaggtcc   7260
 20   aggcgctggc cgctgaaatt aaatcaaaac tcatttgagt taatgaggta aagagaaaat   7320
      gagcaaaagc acaaacacgc taagtgccgg ccgtccgagc gcacgcagca gcaaggctgc   7380
      aacgttggcc agcctggcag acacgccagc catgaagcgg gtcaactttc agttgccggc   7440
      ggaggatcac accaagctga agatgtacgc ggtacgccaa ggcaagacca ttaccgagct   7500
      gctatctgaa tacatcgcgc agctaccaga gtaaatgagc aaatgaataa atgagtagat   7560
 25   gaattttagc ggctaaagga ggcggcatgg aaaatcaaga acaaccaggc accgacgccg   7620
      tggaatgccc catgtgtgga ggaacgggcg gttggccagg cgtaagcggc tgggttgtct   7680
      gccggccctg caatggcact ggaacccca agcccgagga atcggcgtga gcggtcgcaa   7740
      accatccggc ccggtacaaa tcggcgcggc gctgggtgat gacctggtgg agaagttgaa   7800
      ggccgcgcag gccgcccagc ggcaacgcat cgaggcagaa gacgccccgg tgaatcgtgg   7860
 30   caaggggccg ctgatcgaat ccgcaaagaa tcccggcaac cgccggcagc cggtgcgccg   7920
      tcgattagga agccgcccaa gggcgacgag caaccagatt ttttcgttcc gatgctctat   7980
      gacgtgggca cccgcgatag tcgcagcatc atggacgtgg ccgtttttccg tctgtcgaag   8040
      cgtgaccgac gagctggcga ggtgatccgc tacgagcttc cagacgggca cgtagaggtt   8100
      tccgcagggc cggccggcat ggccagtgtg tgggattacg acctggtact gatggcggtt   8160
 35   tcccatctaa ccgaatccat gaaccgatac cgggaaggga agggagacaa gcccggccgc   8220
      gtgttccgtc cacacgttgc ggacgtactc aagttctgcc ggcgagccga tggcggaaag   8280
      cagaaagacg acctggtaga aacctgcatt cggttaaaca ccacgcacgt tgccatgcag   8340
      cgtacgaaga aggccaagaa cggccgcctg gtgacggtat ccgagggtga gccttgatt   8400
      agccgctaca agatcgtaaa gagcgaaacc gggcggccgg agtacatcga gatcgagcta   8460
 40   gctgattgga tgtaccgcga gatcacagaa ggcaagaacc cggacgtgct gacggttcac   8520
      cccgattact ttttgatcga tcccggcatc ggccgttttc tctaccgcct ggcacgccgc   8580
      gccgcaggca aggcagaagc cagatggttg ttcaagacga tctacgaacg cagtggcagc   8640
      gccggagagt tcaagaagtt ctgtttcacc gtgcgcaagc tgatcgggtc aaatgacctg   8700
      ccggagtacg atttgaagga ggaggcgggg caggctggcc cgatcctagt catgcgctac   8760
 45   cgcaacctga tcgagggcga agcatccgcc ggttcctaat gtacggagca gatgctaggg   8820
      caaattgccc tagcagggga aaaaggtcga aaaggtctct ttcctgtgga tagcacgtac   8880
      attgggaacc caaagccgta cattgggaac cggaacccgt acattgggaa cccaaagccg   8940
      tacattggga accggtcaca catgtaagtg actgatataa aagagaaaaa aggcgatttt   9000
      tccgcctaaa actctttaaa acttattaaa actcttaaaa cccgcctggc ctgtgcataa   9060
```

```
      ctgtctggcc agcgcacagc cgaagagctg caaaaagcgc ctacccttcg gtcgctgcgc   9120
      tccctacgcc ccgccgcttc gcgtcggcct atcgcggcct atgcggtgtg aaataccgca   9180
      cagatgcgta aggagaaaat accgcatcag gcgctcttcc gcttcctcgc tcactgactc   9240
      gctgcgctcg gtcgttcggc tgcggcgagc ggtatcagct cactcaaagg cggtaatacg   9300
   5  gttatccaca gaatcagggg ataacgcagg aaagaacatg tgagcaaaag gccagcaaaa   9360
      ggccaggaac cgtaaaaagg ccgcgttgct ggcgtttttc cataggctcc gcccccctga   9420
      cgagcatcac aaaaatcgac gctcaagtca gaggtggcga acccgacag gactataaag   9480
      ataccaggcg tttccccctg gaagctccct cgtgcgctct cctgttccga ccctgccgct   9540
      taccggatac ctgtccgcct ttctcccttc gggaagcgtg gcgctttctc atagctcacg   9600
  10  ctgtaggtat ctcagttcgg tgtaggtcgt tcgctccaag ctgggctgtg tgcacgaacc   9660
      ccccgttcag cccgaccgct gcgccttatc cggtaactat cgtcttgagt ccaacccggt   9720
      aagacgacga ttatcgccac tggcagcagc cactggtaac aggattagca gagcgaggta   9780
      tgtaggcggt gctacagagt tcttgaagtg gtggcctaac tacggctaca ctagaaggac   9840
      agtatttggt atctgcgctc tgctgaagcc agttaccttc ggaaaaagag ttggtagctc   9900
  15  ttgatccggc aaacaaacca ccgctggtag cggtggtttt tttgtttgca agcagcagat   9960
      tacgcgcaga aaaaaggat ctcaagaaga tcctttgatc ttttctacgg ggtctgacgc   10020
      tcagtggaac gaaaactcac gttaaggggat tttggtcatg catgatatat ctcccaattt   10080
      gtgtagggct tattatgcac gcttaaaaat aataaagca gacttgacct gatagtttgg   10140
      ctgtgagcaa ttatgtgctt agtgcatcta acgcttgagt taagccgcgc cgcgaagcgg   10200
  20  cgtcggcttg aacgaattc tagctagaca ttatttgccg actaccttgg tgatctcgcc   10260
      tttcacgtag tggacaaatt cttccaactg atctgcgcgc gaggccaagc gatcttcttc   10320
      ttgtccaaga taagcctgtc tagcttcaag tatgacgggc tgatactggg ccggcaggcg   10380
      ctccattgcc cagtcggcag cgacatcctt cggcgcgatt ttgccggtta ctgcgctgta   10440
      ccaaatgcgg gacaacgtaa gcactacatt tcgctcatcg ccagcccagt cgggcggcga   10500
  25  gttccatagc gttaaggttt catttagcgc ctcaaataga tcctgttcag gaaccggatc   10560
      aaagagttcc tccgccgctg gacctaccaa ggcaacgcta tgttctcttg cttttgtcag   10620
      caagatagcc agatcaatgt cgatcgtggc tggctcgaag atacctgcaa gaatgtcatt   10680
      gcgctgccat tctccaaatt gcagttcgcg cttagctgga taacgccacg gaatgatgtc   10740
      gtcgtgcaca acaatggtga cttctacagc gcggagaatc tcgctctctc caggggaagc   10800
  30  cgaagtttcc aaaaggtcgt tgatcaaagc tcgccgcgtt gtttcatcaa gccttacggt   10860
      caccgtaacc agcaaatcaa tatcactgtg tggcttcagg ccgccatcca ctgcggagcc   10920
      gtacaaatgt acggccagca acgtcggttc gagatggcgc tcgatgacgc caactacctc   10980
      tgatagttga gtcgatactt cggcgatcac cgcttccccc atgatgttta actttgtttt   11040
      agggcgactg ccctgctgcg taacatcgtt gctgctccat aacatcaaac atcgacccac   11100
  35  ggcgtaacgc gcttgctgct tggatgcccg aggcatagac tgtaccccaa aaaaacagtc   11160
      ataacaagcc atgaaaaccg ccactgcgtt ccatg                               11195


      <210>   3

  40  <211>   12415
      <212>   DNA
      <213>   synthetic: expression vector - binary vector pSUNUbiGUS

      <400>   3
  45  aatattcaaa caaacacata cagcgcgact tatcatggac atacaaatgg acgaacggat     60
      aaacctttttc acgccctttt aaatatccga ttattctaat aaacgctctt ttctcttagg    120
      tttacccgcc aatatatcct gtcaaacact gatagtttaa actgaaggcg ggaaacgaca    180
      atcagatcta gtaggaaaca gctatgacca tgattacgcc aagcttgcat gcctgcaggt    240
      cgaaattcga gctcggtacc cggtcactgg attttggttt taggaattag aaattttatt    300
```

```
     gatagaagta ttttacaaat acaaatacat actaagggtt tcttatatgc tcaacacatg    360
     agcgaaaccc tataagaacc ctaattccct tatctgggaa ctactcacac attattctgg    420
     agaaaaatag agagagatag atttgtagag agagactggt gattttgcg  ccgggtaccg    480
     agctcggtag caattcccga ggctgtagcc gacgatggtg cgccaggaga gttgttgatt    540
  5  cattgtttgc ctccctgctg cggttttttca ccgaagttca tgccagtcca gcgttttttgc   600
     agcagaaaag ccgccgactt cggtttgcgg tcgcgagtga agatcccttt cttgttaccg    660
     ccaacgcgca atatgccttg cgaggtcgca aaatcggcga aattccatac ctgttcaccg    720
     acgacggcgc tgacgcgatc aaagacgcgg tgatacatat ccagccatgc acactgatac    780
     tcttcactcc acatgtcggt gtacattgag tgcagcccgg ctaacgtatc cacgccgtat    840
  10 tcggtgatga taatcggctg atgcagtttc tcctgccagg ccagaagttc ttttttccagt    900
     accttctctg ccgtttccaa atcgccgctt tggacatacc atccgtaata acggttcagg    960
     cacagcacat caaagagatc gctgatggta tcggtgtgag cgtcgcagaa cattacattg   1020
     acgcaggtga tcggacgcgt cgggtcgagt ttacgcgttg cttccgccag tggcgaaata   1080
     ttcccgtgca cttgcggacg ggtatccggt tcgttggcaa tactccacat caccacgctt   1140
  15 gggtggtttt tgtcacgcgc tatcagctct ttaatcgcct gtaagtgcgc ttgctgagtt   1200
     tccccgttga ctgcctcttc gctgtacagt tctttcggct tgttgcccgc ttcgaaacca   1260
     atgcctaaag agaggttaaa gccgacagca gcagtttcat caatcaccac gatgccatgt   1320
     tcatctgccc agtcgagcat ctcttcagcg taaggtaat  gcgaggtacg gtaggagttg    1380
     gccccaatcc agtccattaa tgcgtggtcg tgcaccatca gcacgttatc gaatcctttg   1440
  20 ccacgtaagt ccgcatcttc atgacgacca aagccagtaa agtagaacgg tttgtggtta   1500
     atcaggaact gttcgccctt cactgccact gaccggatgc cgacgcgaag cgggtagata   1560
     tcacactctg tctggctttt ggctgtgacg cacagttcat agagataacc ttcacccggt   1620
     tgccagaggt gcggattcac cacttgcaaa gtcccgctag tgccttgtcc agttgcaacc   1680
     acctgttgat ccgcatcacg cagttcaacg ctgacatcac cattggccac cacctgccag   1740
  25 tcaacagacg cgtggttaca gtcttgcgcg acatgcgtca ccacggtgat atcgtccacc   1800
     caggtgttcg gcgtggtgta gagcattacg ctgcgatgga ttccggcata gttaaagaaa   1860
     tcatggaagt aagactgctt tttcttgccg ttttcgtcgg taatcaccat tcccggcggg   1920
     atagtctgcc agttcagttc gttgttcaca caaacggtga tacctgcaca tcaacaaatt   1980
     ttggtcatat attagaaaag ttataaatta aaatatacac acttataaac tacagaaaag   2040
  30 caattgctat atactacatt cttttatttt gaaaaaaata tttgaaatat tatattacta   2100
     ctaattaatg ataattatta tatatatatc aaaggtagaa gcagaaactt acgtacactt   2160
     ttcccggcaa taacatacgg cgtgacatcg gcttcaaatg gcgtatagcc gccctgatgc   2220
     tccatcactt cctgattatt gacccacact ttgccgtaat gagtgaccgc atcgaaacgc   2280
     agcacgatac gctggcctgc ccaacctttc ggtataaaga cttcgcgctg ataccagacg   2340
  35 ttgcccgcat aattacgaat atctgcatcg gcgaactgat cgttaaaact gcctggcaca   2400
     gcaattgccc ggctttcttg taacgcgctt tcccaccaac gctgaccaat tccacagttt   2460
     tcgcgatcca gactgaatgc ccacaggccg tcgagttttt tgatttcacg ggttggggtt   2520
     tctacaggac gtaccatggt cgatcgactc tagactagtg gatccgatat cgcccgggct   2580
     gcagaagtaa caccaaacaa caggtgagc  atcgacaaaa gaaacagtac caagcaaata   2640
  40 aatagcgtat gaaggcaggg ctaaaaaaat ccacatatag ctgctgcata tgccatcatc   2700
     caagtatatc aagatcaaaa taattataaa acatacttgt ttattataat agataggtac   2760
     tcaaggttag agcatatgaa tagatgctgc atatgccatc atgtatatgc atcagtaaaa   2820
     cccacatcaa catgtatacc tatcctagat cgatatttcc atccatctta aactcgtaac   2880
     tatgaagatg tatgacacac acatacagtt ccaaaattaa taaatacacc aggtagtttg   2940
  45 aaacagtatt ctactccgat ctagaacgaa tgaacgaccg cccaaccaca ccacatcatc   3000
     acaaccaagc gaacaaaaag catctctgta tatgcatcag taaaacccgc atcaacatgt   3060
     atacctatcc tagatcgata tttccatcca tcatcttcaa ttcgtaacta tgaatatgta   3120
     tggcacacac atacagatcc aaaattaata aatccaccag gtagtttgaa acagaattct   3180
     actccgatct agaacgaccg cccaaccaga ccacatcatc acaaccaaga caaaaaaaag   3240
```

```
     catgaaaaga tgacccgaca aacaagtgca cggcatatat tgaaataaag gaaaagggca    3300
     aaccaaaccc tatgcaacga aacaaaaaaa atcatgaaat cgatcccgtc tgcggaacgg    3360
     ctagagccat cccaggattc cccaaagaga aacactggca agttagcaat cagaacgtgt    3420
     ctgacgtaca ggtcgcatcc gtgtacgaac gctagcagca cggatctaac acaaacacgg    3480
  5  atctaacaca aacatgaaca gaagtagaac taccgggccc taaccatgga ccggaacgcc    3540
     gatctagaga aggtagagag ggggggggg ggaggacgag cggcgtacct tgaagcggag      3600
     gtgccgacgg gtggatttgg gggagatctg gttgtgtgtg tgtgcgctcc gaacaacacg    3660
     aggttgggga aagagggtgt ggaggggtg tctatttatt acggcgggcg aggaagggaa     3720
     agcgaaggag cggtgggaaa ggaatccccc gtagctgccg tgccgtgaga ggaggaggag    3780
 10  gccgcctgcc gtgccggctc acgtctgccg ctccgccacg caatttctgg atgccgacag    3840
     cggagcaagt ccaacggtgg agcggaactc tcgagagggg tccagaggca gcgacagaga    3900
     tgccgtgccg tctgcttcgc ttggcccgac gcgacgctgc tggttcgctg gttggtgtcc    3960
     gttagactcg tcgacggcgt ttaacaggct ggcattatct actcgaaaca agaaaaatgt    4020
     ttccttagtt ttttaatttt cttaaagggt atttgtttaa tttttagtca ctttatttta    4080
 15  ttctattta tatctaaatt attaaataaa aaaactaaaa tagagtttta gttttcttaa     4140
     tttagaggct aaaatagaat aaaatagatg tactaaaaaa attagtctat aaaaaccatt    4200
     aaccctaaac cctaaatgga tgtactaata aaatggatga agtattatat aggtgaagct    4260
     atttgcaaaa aaaaggaga acacatgcac actaaaaaga taaaactgta gagtcctgtt      4320
     gtcaaaatac tcaattgtcc tttagaccat gtctaactgt tcatttatat gattctctaa    4380
 20  aacactgata ttattgtagt actatagatt atattattcg tagagtaaag tttaaatata    4440
     tgtataaaga tagataaact gcacttcaaa caagtgtgac aaaaaaaata tgtggtaatt    4500
     ttttataact tagacatgca atgctcatta tctctagaga ggggcacgac cgggtcacgc    4560
     tgcactgcag gaattcgatg ggctcgaggt accgagctcg gtacccactg gattttggtt    4620
     ttaggaatta gaaattttat tgatagaagt attttacaaa tacaaataca tactaagggt    4680
 25  ttcttatatg ctcaacacat gagcgaaacc ctataagaac cctaattccc ttatctggga    4740
     actactcaca cattattata gagagagata gatttgtaga gagagactgg tgatttcagc    4800
     ggcatgcctg caggtcgact cagatctggg taactggcct aactggcctt ggaggagctg    4860
     gcaactcaaa atccctttgc caaaaaccaa catcatgcca tccaccatgc ttgtatccag    4920
     ctgcgcgcaa tgtaccccgg gctgtgtatc ccaaagcctc atgcaaccta acagatggat    4980
 30  cgtttggaag gcctataaca gcaaccacag acttaaaacc ttgcgcctcc atagacttaa    5040
     gcaaatgtgt gtacaatgtg gatcctaggc ccaacctttg atgcctatgt gacacgtaaa    5100
     cagtactctc aactgtccaa tcgtaagcgt tcctagcctt ccagggccca gcgtaagcaa    5160
     taccagccac aacaccctca acctcagcaa ccaaccaagg gtatctatct tgcaacctct    5220
     ctagatcatc aatccactct tgtggtgttt gtggctctgt cctaaagttc actgtagacg    5280
 35  tctcaatgta atggttaacg atatcacaaa ccgcggccat atcagctgct gtagctggcc    5340
     taatctcaac tggtctcctc tccggagaca tgtcgactct agaggatccc ccgggctgca    5400
     gaagtaacac caaacaacag ggtgagcatc gacaaagaa acagtaccaa gcaaataaat     5460
     agcgtatgaa ggcagggcta aaaaaatcca catatagctg ctgcatatgc catcatccaa    5520
     gtatatcaag atcaaaataa ttataaaaca tacttgttta ttataataga taggtactca    5580
 40  aggttagagc atatgaatag atgctgcata tgccatcatg tatatgcatc agtaaaaccc    5640
     acatcaacat gtatacctat cctagatcga tatttccatc catcttaaac tcgtaactat    5700
     gaagatgtat gacacacaca tacagttcca aaattaataa atacaccagg tagtttgaaa    5760
     cagtattcta ctccgatcta gaacgaatga acgaccgccc aaccacacca catcatcaca    5820
     accaagcgaa caaaaagcat ctctgtatat gcatcagtaa aacccgcatc aacatgtata    5880
 45  cctatcctag atcgatattt ccatccatca tcttcaattc gtaactatga atatgtatgg    5940
     cacacacata cagatccaaa attaataaat ccaccaggta gtttgaaaca gaattctact    6000
     ccgatctaga acgaccgccc aaccagacca catcatcaca accaagacaa aaaaaagcat    6060
     gaaagatga cccgacaaac aagtgcacgg catatattga aataaaggaa aagggcaaac     6120
     caaaccctat gcaacgaaac aaaaaaaatc atgaaatcga tcccgtctgc ggaacggcta    6180
```

```
      gagccatccc aggattcccc aaagagaaac actggcaagt tagcaatcag aacgtgtctg   6240
      acgtacaggt cgcatccgtg tacgaacgct agcagcacgg atctaacaca aacacggatc   6300
      taacacaaac atgaacagaa gtagaactac cgggccctaa ccatggaccg gaacgccgat   6360
      ctagagaagg tagagagggg ggggggggga ggacgagcgg cgtaccttga agcggaggtg   6420
   5  ccgacgggtg gatttggggg agatctggtt gtgtgtgtgt gcgctccgaa caacacgagg   6480
      ttggggaaag agggtgtgga gggggtgtct atttattacg gcgggcgagg aagggaaagc   6540
      gaaggagcgg tgggaaagga atccccgta gctgccgtgc cgtgagagga ggaggaggcc   6600
      gcctgccgtg ccggctcacg tctgccgctc cgccacgcaa tttctggatg ccgacagcgg   6660
      agcaagtcca acggtggagc ggaactctcg agagggtcc agaggcagcg acagagatgc   6720
  10  cgtgccgtct gcttcgcttg cccgacgcg acgctgctgg ttcgctggtt ggtgtccgtt   6780
      agactcgtcg acggcgttta acaggctggc attatctact cgaaacaaga aaaatgtttc   6840
      cttagttttt ttaatttctt aaagggtatt tgtttaattt ttagtcactt tattttattc   6900
      tattttatat ctaaattatt aaataaaaaa actaaaatag agttttagtt ttcttaattt   6960
      agaggctaaa atagaataaa atagatgtac taaaaaaatt agtctataaa aaccattaac   7020
  15  cctaaacct aaatggatgt actaataaaa tggatgaagt attatatagg tgaagctatt   7080
      tgcaaaaaaa aaggagaaca catgcacact aaaaagataa aactgtagag tcctgttgtc   7140
      aaaatactca attgtccttt agaccatgtc taactgttca tttatatgat tctctaaaac   7200
      actgatatta ttgtagtact atagattata ttattcgtag agtaaagttt aaatatatgt   7260
      ataaagatag ataaactgca cttcaaacaa gtgtgacaaa aaaaatatgt ggtaattttt   7320
  20  tataacttag acatgcaatg ctcattatct ctagagaggg gcacgaccgg gtcacgctgc   7380
      actgcaggaa ttcgatatca agctggctga gtggctcctt caacgttgcg gttctgtcag   7440
      ttccaaacgt aaaacggctt gtcccgcgtc atcggcgggg gtcataacgt gactccctta   7500
      attctccgct catgatcaga ttgtcgtttc ccgccttcag tttaaactat cagtgtttga   7560
      caggatcact gcttggtaat aattgtcatt agattgtttt tatgcataga tgcactcgaa   7620
  25  atcagccaat tttagacaag tatcaaacgg atgttaattc agtacattaa agacgtccgc   7680
      aatgtgttat taagttgtct aagcgtcaat ttgtttacac cacaatatat cctgccacca   7740
      gccagccaac agctccccga ccggcagctc ggcacaaaat caccacgcgt ctaaaaaggt   7800
      gatgtgtatt tgagtaaaac agcttgcgtc atgcggtcgc tgcgtatatg atgcgatgag   7860
      taaataaaca aatacgcaag gggaacgcat gaaggttatc gctgtactta accagaaagg   7920
  30  cgggtcaggc aagacgacca tcgcaaccca tctagcccgc gccctgcaac tcgccggggc   7980
      cgatgttctg ttagtcgatt ccgatcccca gggcagtgcc cgcgattggg cggccgtgcg   8040
      ggaagatcaa ccgctaaccg ttgtcggcat cgaccgcccg acgattgacc gcgacgtgaa   8100
      ggccatcggc cggcgcgact tcgtagtgat cgacggagcg ccccaggcgg cggacttggc   8160
      tgtgtccgcg atcaaggcag ccgacttcgt gctgattccg gtgcagccaa gcccttacga   8220
  35  catatgggcc accgccgacc tggtggagct ggttaagcag cgcattgagg tcacggatgg   8280
      aaggctacaa gcggcctttg tcgtgtcgcg ggcgatcaaa ggcacgcgca tcggcggtga   8340
      ggttgccgag gcgctggccg ggtacgagct gcccattctt gagtcccgta tcacgcagcg   8400
      cgtgagctac ccaggcactg ccgccgccgg cacaaccgtt cttgaatcag aacccgaggg   8460
      cgacgctgcc cgcgaggtcc aggcgctggc cgctgaaatt aaatcaaaac tcatttgagt   8520
  40  taatgaggta aagagaaaat gagcaaaagc acaaacacgc taagtgccgg ccgtccgagc   8580
      gcacgcagca gcaaggctgc aacgttggcc agcctggcag acacgccagc catgaagcgg   8640
      gtcaactttc agttgccggc ggaggatcac accaagctga agatgtacgc ggtacgccaa   8700
      ggcaagacca ttaccgagct gctatctgaa tacatcgcgc agctaccaga gtaaatgagc   8760
      aaatgaataa atgagtagat gaattttagc ggctaaagga ggcggcatgg aaaatcaaga   8820
  45  acaaccaggc accgacgccg tggaatgccc catgtgtgga ggaacgggcg gttggccagg   8880
      cgtaagcggc tgggttgtct ccggccctg caatggcact ggaacccca agcccgagga   8940
      atcggcgtga gcggtcgcaa accatccggc ccggtacaaa tcggcgcggc gctgggtgat   9000
      gacctggtgg agaagttgaa ggccgcgcag ccgcccagc ggcaacgcat cgaggcagaa   9060
      gacgccccgg tgaatcgtgg caagggggccg ctgatcgaat ccgcaaagaa tcccggcaac   9120
```

```
     cgccggcagc cggtgcgccg tcgattagga agccgcccaa gggcgacgag caaccagatt   9180
     ttttcgttcc gatgctctat gacgtgggca cccgcgatag tcgcagcatc atggacgtgg   9240
     ccgtttttcg tctgtcgaag cgtgaccgac gagctggcga ggtgatccgc tacgagcttc   9300
     cagacgggca cgtagaggtt tccgcagggc cggccggcat ggccagtgtg tgggattacg   9360
 5   acctggtact gatggcggtt tcccatctaa ccgaatccat gaaccgatac cgggaaggga   9420
     agggagacaa gcccggccgc gtgttccgtc cacacgttgc ggacgtactc aagttctgcc   9480
     ggcgagccga tggcggaaag cagaaagacg acctggtaga aacctgcatt cggttaaaca   9540
     ccacgcacgt tgccatgcag cgtacgaaga aggccaagaa cggccgcctg gtgacggtat   9600
     ccgagggtga agccttgatt agccgctaca agatcgtaaa gagcgaaacc gggcggccgg   9660
10   agtacatcga gatcgagcta gctgattgga tgtaccgcga gatcacagaa ggcaagaacc   9720
     cggacgtgct gacggttcac cccgattact ttttgatcga tcccggcatc ggccgttttc   9780
     tctaccgcct ggcacgccgc gccgcaggca aggcagaagc cagatggttg ttcaagacga   9840
     tctacgaacg cagtggcagc gccggagagt tcaagaagtt ctgtttcacc gtgcgcaagc   9900
     tgatcgggtc aaatgacctg ccggagtacg atttgaagga ggaggcgggg caggctggcc   9960
15   cgatcctagt catgcgctac cgcaacctga tcgagggcga agcatccgcc ggttcctaat  10020
     gtacggagca gatgctaggg caaattgccc tagcagggga aaaaggtcga aaaggtctct  10080
     ttcctgtgga tagcacgtac attgggaacc caaagccgta cattgggaac cggaacccgt  10140
     acattgggaa cccaaagccg tacattggga accggtcaca catgtaagtg actgatataa  10200
     aagagaaaaa aggcgatttt ccgcctaaa actctttaaa acttattaaa actcttaaaa  10260
20   cccgcctggc ctgtgcataa ctgtctggcc agcgcacagc cgaagagctg caaaaagcgc  10320
     ctacccttcg gtcgctgcgc tccctacgcc ccgccgcttc gcgtcggcct atcgcggcct  10380
     atgcggtgtg aaataccgca cagatgcgta aggagaaaat accgcatcag cgctcttcc  10440
     gcttcctcgc tcactgactc gctgcgctcg gtcgttcggc tgcggcgagc ggtatcagct  10500
     cactcaaagg cggtaatacg gttatccaca gaatcagggg ataacgcagg aaagaacatg  10560
25   tgagcaaaag gccagcaaaa ggccaggaac cgtaaaaagg ccgcgttgct ggcgtttttc  10620
     cataggctcc gcccccctga cgagcatcac aaaaatcgac gctcaagtca gaggtggcga  10680
     aacccgacag gactataaag ataccaggcg tttcccctg gaagctccct cgtgcgctct  10740
     cctgttccga ccctgccgct taccggatac ctgtccgcct ttctcccttc gggaagcgtg  10800
     gcgctttctc atagctcacg ctgtaggtat ctcagttcgg tgtaggtcgt tcgctccaag  10860
30   ctgggctgtg tgcacgaacc ccccgttcag cccgaccgct gcgccttatc cggtaactat  10920
     cgtcttgagt ccaacccggt aagacacgac ttatcgccac tggcagcagc cactggtaac  10980
     aggattagca gagcgaggta tgtaggcggt gctacagagt tcttgaagtg gtggcctaac  11040
     tacggctaca ctagaaggac agtatttggt atctgcgctc tgctgaagcc agttaccttc  11100
     ggaaaaagag ttggtagctc ttgatccggc aaacaaacca ccgctggtag cggtggtttt  11160
35   tttgtttgca agcagcagat tacgcgcaga aaaaaaggat ctcaagaaga tcctttgatc  11220
     ttttctacgg ggtctgacgc tcagtggaac gaaaactcac gttaagggat tttggtcatg  11280
     catgatatat ctcccaattt gtgtaggct tattatgcac gcttaaaaat aataaaagca  11340
     gacttgacct gatagtttgg ctgtgagcaa ttatgtgctt agtgcatcta acgcttgagt  11400
     taagccgcgc cgcgaagcgg cgtcggcttg aacgaatttc tagctagaca ttatttgccg  11460
40   actaccttgg tgatctcgcc tttcacgtag tggacaaatt cttccaactg atctgcgcgc  11520
     gaggccaagc gatcttcttc ttgtccaaga taagcctgtc tagcttcaag tatgacgggc  11580
     tgatactggg ccggcaggcg ctccattgcc cagtcggcag cgacatcctt cggcgcgatt  11640
     ttgccggtta ctgcgctgta ccaaatgcgg gacaacgtaa gcactacatt cgctcatcg  11700
     ccagcccagt cgggcggcga gttccatagc gttaaggttt catttagcgc ctcaaataga  11760
45   tcctgttcag gaaccggatc aaagagttcc tccgccgctg gacctaccaa ggcaacgcta  11820
     tgttctcttg cttttgtcag caagatagcc agatcaatgt cgatcgtggc tggctcgaag  11880
     atacctgcaa gaatgtcatt gcgctgccat tctccaaatt gcagttcgcg cttagctgga  11940
     taacgccacg gaatgatgtc gtcgtgcaca acaatggtga cttctacagc gcggagaatc  12000
     tcgctctctc caggggaagc cgaagtttcc aaaaggtcgt tgatcaaagc tcgccgcgtt  12060
```

```
      gtttcatcaa gccttacggt caccgtaacc agcaaatcaa tatcactgtg tggcttcagg  12120
      ccgccatcca ctgcggagcc gtacaaatgt acggccagca acgtcggttc gagatggcgc  12180
      tcgatgacgc caactacctc tgatagttga gtcgatactt cggcgatcac cgcttccccc  12240
      atgatgttta actttgtttt agggcgactg ccctgctgcg taacatcgtt gctgctccat  12300
   5  aacatcaaac atcgacccac ggcgtaacgc gcttgctgct tggatgcccg aggcatagac  12360
      tgtaccccaa aaaaacagtc ataacaagcc atgaaaaccg ccactgcgtt ccatg        12415
```